

SR107AD, SR108AD, SR109AD

User Information for SR107AD, SR108AD, SR109AD

Correct Use

SR10.AD is an emergency stop safety relay combination that combines non-time-delayed and time-delayed contacts in a very compact housing. This permits dangerous components of a system to be switched off quickly and safely in an emergency situation. At the same time, other circuits can continue to be supplied with voltage for up to 30 seconds to allow a tool to be moved to its idle position or to brake following parts, for exam-



(not for plug-in terminals)

Features

- 4 positively driven safety relays contacts. Possible variants:
 - 3 non-time-delayed and 1 time-delayed contact
 - 2 non-time-delayed and 2 time-delayed contact
 - 1 non-time-delayed and 3 time-delayed contact
- Continuously adjustable time delay (1 bis 30s)
- Connection of:
 - emergency stop buttons
 - safety switches
 - non-contacts safety switches
 - OSSD-Outputs
- 1- or 2-channel activation possible
- Feedback loop for monitoring downstream contactors or expansion modules
- Cyclical monitoring of the output contacts
- Indication of the switching state via LED
- 2 start behaviors possible:
 - monitored manual start
 - automatic start
- Short circuit and earth fault monitoring
- Up to PL e, SILCL 3, category 4

Function

The moving parts of a machine or system can be quickly and safely stopped in case of danger with the non-time-delayed contacts of the SR10.AD. Safety contacts with time-delay switch-off are also integrated into the SR10.AD. They are used whenever it is safer to keep supplying voltage to parts of a machine after the emergency stop switch is operated.

It is ensured that a single fault or malfunction does not lead to a loss of the safety function and that every fault is detected by cyclical self-monitoring no later than when the

system is switched off and switched on again.

The time-delay contacts are activated at the same time as the non-time-delay contacts; however, when the emergency stop button is pressed, the contacts are only deactivated after the time set on the potentiometer (1 ... 30s).

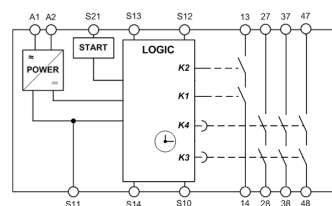
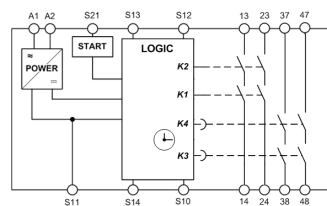
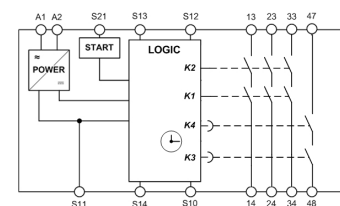


Fig. 1 Block diagram:

SR107AD (1nd/3d);



SR108AD (2nd/2d);



SR109AD (3rd/1d)

Installation

As per DIN EN 60204-1, the device is intended for installation in control cabinets with a minimum degree of protection of IP54. It is mounted on a 35-mm DIN rail according to DIN EN 60715 TH35.

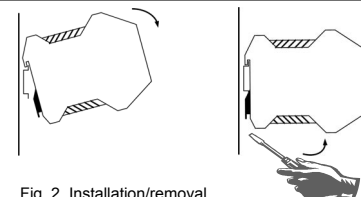


Fig. 2 Installation/removal

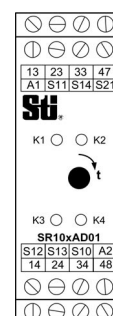
Safety Precautions



- Installation and commissioning of the device must be performed only by authorized personnel.
- Observe the country-specific regulations when installing the device.
- The electrical connection of the device is only allowed to be made with the device isolated.
- The wiring of the device must comply with the instructions in this user information, otherwise there is a risk that the safety function will be lost.
- It is not allowed to open the device, tamper with the device or bypass the safety devices.
- All relevant safety regulations and standards are to be observed.
- The overall concept of the control system in which the device is incorporated must be validated by the user.
- Failure to observe the safety regulations can result in death, serious injury and serious damage.

Electrical Connection

- A control transformer according to EN 61558-2-6 or a power supply unit with electrical isolation from the mains must be connected.
- External fusing of the safety contacts (6A slow-blow or 8A quick-action or 10AgG) must be provided.
- A maximum length of the control lines of 1000 meters with a line cross section of 0.75 mm² must not be exceeded.
- The line cross section must not exceed 2.5 mm².
- If the device does not function after commissioning, it must be returned to the manufacturer unopened. Opening the device will void the warranty.



A1:	Power supply
A2:	Power supply
S11:	DC 24V control voltage
S10:	Control line
S12:	Control line
S13:	Control line
S14:	Control line
S21:	Start, Control line
13-14:	Safety contact 1 (nd)
23-24/27-28:	Safety contact 2 (d / nd)
33-34/37-38:	Safety contact 3 (d / nd)
47-48:	Safety contact 4 (d)

Fig. 3 Connections nd = non-time delayed; d = time-delayed

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Applications

Depending on the application or the result of the risk assessment according to EN ISO 13849-1, the device must be wired as shown in Fig. 1 to Fig. 11. Non-time delayed contacts can be used up to category 4, PL e, time-delayed safety contacts up to category 3, PL e.

Emergency Stop Circuit

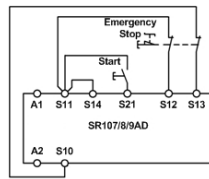


Fig. 1:
Two-channel emergency stop circuit with short circuit and earth fault monitoring.
(category 4, up to PL e)

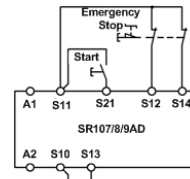


Fig. 2:
Two-channel emergency stop circuit with earth fault monitoring.
(category 3, up to PL d)

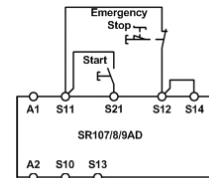


Fig. 3:
Single-channel emergency stop circuit with earth fault monitoring.
(category 1, up to PL c)

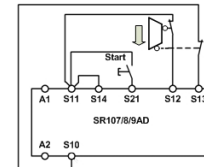


Fig. 4:
Two-channel sliding guard monitoring with short circuit and earth fault monitoring.
(category 4, up to PL e)

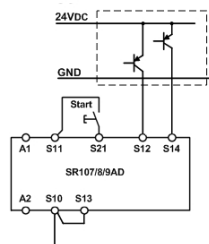


Fig. 5:
Two-channel emergency stop with pnp-outputs/OSSD-outputs with short circuit monitoring.
(category 4, up to PL e)

Warning:

In order to activate earth fault monitoring, the PE must be connected only to the power supply unit in accordance with EN60204-1.

Starting Behavior

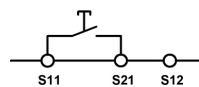


Fig. 6:
Monitored manual start.
It is monitored that the start button was opened before the emergency stop button closes.
(Prerequisite: operating voltage must not be interrupted)

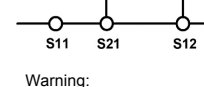


Fig. 7:
Automatic start (e.g. for application with a safety door).

Warning:
Safety contacts switch when the power supply is connected.

Max perm. delay during closing of the safety switches on S12 and S13:
S12 before S13: 300ms;
S13 before S12: any

Feedback Loop

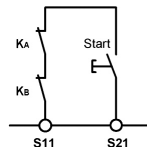


Fig. 8:
Feedback loop for monitored manual start:
The feedback loop monitors contactors or the expansion modules.

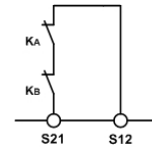


Fig. 9:
Feedback loop for automatic start:
The feedback loop monitors contactors or the expansion modules.

Power supply and Safety contacts

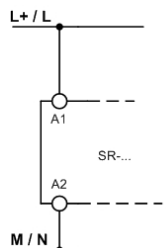


Fig. 10:
Power supply A1 and A2.
(Power supply according to techn. Data)

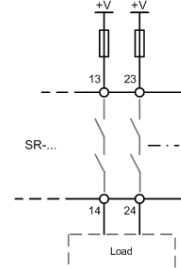


Fig. 11:
Connecting load to safety contacts.
(Figure shows example.
Voltage „+V“ according to techn. Data)

Commissioning Procedure

Note: The items listed under "Electrical connection" must be observed during commissioning.

1. Wiring emergency stop circuit:
Wire the emergency stop circuit according to the required Performance Level determined (see Fig. 1 to Fig 5).
2. Wiring start circuit:
Wire the start circuit according to Fig. 6 or Fig. 7 to set the starting behavior.
Warning:
If "Automatic start" is set, bear in mind that the safety contacts will switch immediately after the power supply is connected. If "Monitored manual start" is set, the start button must be opened after wiring.
3. Wiring feedback loop:
If your application provides for external contactors or expansion modules, connect them to the device according to Fig. 8 or Fig. 9.
4. Wiring power supply:
Connect the power supply to terminals A1 and A2 (Fig. 10).
Warning: Wiring only in de-energized state.
5. Set time delay:
Set the desired time delay on the rotary knob

Warning:

Scale divisions should be regarded only as a setting aid. Always make shure to measure the delay time.

6. Starting the device:

Switch on the operating voltage.

Warning:

If the "Automatic start" starting behavior is set, the safety contacts will close immediately.

If the "Monitored manual start" starting behavior is set, close the start button to close the safety contacts.

LEDs K1, K2, K3 and K4 are lit.

7. Triggering safety function:

Open the emergency stop circuit by actuating the connected safety switch. The safety contacts open immediately.

Warning: Messen Sie die Verzögerungszeit.

8. Reactivation:

Close the emergency stop circuit. If "Automatic start" is selected, the safety contacts will close immediately.

If the "Monitored manual start" starting behavior is set, close the start button to close the safety contacts.



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Maintenance

The device must be checked once per month for proper function and for signs of tampering and bypassing of the safety function (to do this, check the wiring of the device and activate the emergency stop function. Check the delay time).

The device is otherwise maintenance free, provided that it was installed properly.

What to Do in Case of a Fault?

- Device does not switch on:
- Check the wiring by comparing it to the wiring diagrams.
 - Check the safety switch used for correct function and adjustment.
 - Check whether the emergency stop circuit is closed.
 - Check whether the start button (with manual start) is closed.
 - Check the operating voltage at A1 and A2.
 - Is the feedback loop closed?

Device cannot be switched on again after an emergency stop:

- Check whether the emergency stop circuit was closed again.
- Was the start button opened before closing of the emergency stop circuit (with manual start)?
- Is the feedback loop closed?

If the fault still exists, perform the steps listed under "Commissioning Procedure".

If these steps do not remedy the fault either, return the device to the manufacturer for examination.

Opening the device is impermissible and will void the warranty.

Safety Characteristics According to EN ISO 13849-1

The device is certified according to EN ISO 13849-1 up to a Performance Level of PL e.

Note:

Additional data can be requested from the manufacturer for applications that deviate from these conditions.

Safety characteristics according to EN ISO 13849-1 for all variants of SR107/8/9			
Load (DC13; 24V)	<= 0,1A	<= 1A	<= 2A
T10d [years]	20	20	20
Category:			
Time-delay	3	3	3
Non-time-delay	4	4	4
PL	e	e	e
PFHd [1/h]:			
Time-delay	8,84E-08	8,84E-08	8,84E-08
Non-time-delay	4,22E-08	4,22E-08	4,22E-08
nop [cycle / year]	<= 500.000	<= 350.000	<= 100.000

Technical Data

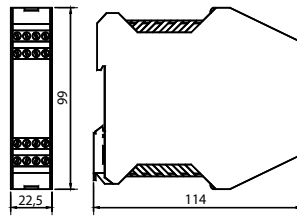
Corresponds to the standards	EN60204-1, EN ISO 13849-1, EN 62061
Operating voltage	AC/DC 24V
Rated supply frequency	50 - 60 Hz
Permissible deviation	+/- 10%
Power consumption	DC 24V AC 24V ca. 4.7W ca. 5.3VA
Control voltage at S11	DC 24V
Control current	approx. 190mA
Response delay after actuation of the buttons	< 20ms
Safety contacts	4 NO contacts (3n/1d, 2n/2d, 1n/3d)
Max. switching voltage	AC 250V
Safety contact breaking capacity	AC: 250V, 2000VA, 8A for omic load 250V, 3A for AC-15 DC: 50V, 8A for omic load 24V, 3A for DC-13
Max. cumulative current on the safety contacts	15A *
Time delay	1 ... 30s, continuously adjustable
Minimum contact load	24V, 20mA
Min. contact fuses	T6A, F8A, 10A gG
Max. line cross section	0.14 - 2.5mm ²
Max. length of control line	1000m at 0.75mm ²
Contact material	AgSnO ₂
Contact service life	mech. approx. 1 x 10 ⁷ , electr. 1 x 10 ⁵ operating cycles
Test voltage	2.5kV (control voltage/contacts)
Rated impulse withstand voltage, leakage path/air gap;	4kV
Rated insulation voltage	250V
Degree of protection	IP20
Degree of contamination	2 (DIN VDE 0110-1)
Overvoltage category	3 (DIN VDE 0110-1)
Temperature range	-15°C ... +40°C
Weight	approx. 250g
Mounting	DIN rail according to EN 60715TH35

*) If several SR10.AD devices are closely spaced under load, the max. total current at the ambient temperature T_a = 20°C ± 2°C = 1A.
If these currents are exceeded, a spacing of 5 mm between the devices must be observed.

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Dimension
Drawing



EC Declaration of Conformity

The manufacturer named below herewith declares that the product fulfills the provisions of the directive(s) listed below and that the related standards have been applied.

OMRON Scientific Technologies Inc.
6550 Dumbarton Circle
Fremont, CA 94555, U.S.A.

Directives applied:
EMC directive 2004/108/EC
Machinery directive 2006/42/EC
RoHS directive 2002/95/EC

Standards applied:
EN ISO 13849-1:2008 + AC:2009
EN 62061:2005
EN ISO 13849-2:2008
EN 60947-5-1:2004 + A1:2009

Certificates:01/205/5080/10
TÜV: NB 0035
TÜV Rheinland Industrie Service GmbH - TÜV Rheinland Group
AM Grauen Stein, 51105 Köln, Germany

Fremont, May 2014

Marty Krikorian
Director, Quality Control
(Authorized Signer of Declarations of Conformity)
OMRON Scientific Technologies, Inc.

Representative in EU:J.H.P.W.Vogelaar
European Quality & Environment Operations Manager
Omron Europe B.V
Zilverenbert 2, 5234 GM, 's-Hertogenbosch
The Netherlands

The signed EC Declaration of Conformity is included with the product.

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- Operator interfaces (HMI) • Distributed I/O • Software

Drives & Motion Controls

- Servo & AC Drives • Motion Controllers & Encoders

Temperature & Process Controllers

- Single and Multi-loop Controllers

Sensors & Vision

- Proximity Sensors • Photoelectric Sensors • Fiber-Optic Sensors
- Amplified Photomicrosensors • Measurement Sensors
- Ultrasonic Sensors • Vision Sensors

Industrial Components

- RFID/Code Readers • Relays • Pushbuttons & Indicators
- Limit and Basic Switches • Timers • Counters • Metering Devices
- Power Supplies

Safety

- Laser Scanners • Safety Mats • Edges and Bumpers • Programmable Safety Controllers • Light Curtains • Safety Relays • Safety Interlock Switches